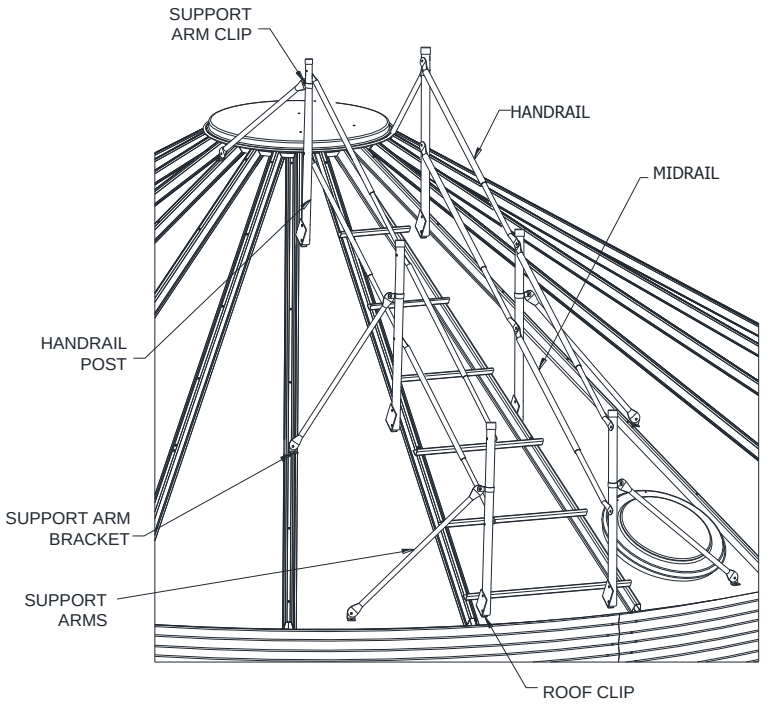
Roof Handrail

Grain Bin
Installation and Storage Instructions

Original Instructions



Read this manual before using product. Failure to follow instructions and safety precautions can result in serious injury, death, or property damage. Keep manual for future reference.

Part Number: 198939 R10
Revised: November 2018

New in this Manual

The following changes have been made in this revision of the manual:

Description	Section
Updated Safety Decal Locations	2.6. Safety Decal Locations and Details on page 7
Updated the roof charts.	Section 3.1.1 – Roof Design Capacities for Non-Structural Roofs on page 11, Section 3.1.2 – Roof Design Capacities for Structural Roofs on page 12

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1. Introduction

This manual describes how to assemble a Westeel Roof Handrail.

Before assembling the roof handrail, please read this manual. Familiarize yourself with the process and the necessary precautions for efficient and safe assembly.

Everyone present at the assembly site is required to be familiar with all safety precautions.

Keep this manual available for frequent reference and review it with new personnel. Call your local distributor or dealer if you need assistance or additional information.

2. Safety

2.1. Safety Alert Symbol and Signal Words

This safety alert symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of injury or death, carefully read the message that follows, and inform others.

Signal Words: Note the use of the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** with the safety messages. The appropriate signal word for each message has been selected using the definitions below as a guideline.

DANGER Indicates an imminently hazardous situation that, if not avoided, will result in serious injury or death.

WARNING Indicates a hazardous situation that, if not avoided, could result in serious injury or death.

CAUTION Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.

NOTICE Indicates a potentially hazardous situation that, if not avoided, may result in property damage.

2.2. General Product Safety

YOU are responsible for the **SAFE** use and maintenance of your roof handrail. **YOU** must ensure that you and anyone else who is going to work around the roof handrail understands all procedures and related **SAFETY** information contained in this manual.

Remember, **YOU** are the key to safety. Good safety practices not only protect you, but also the people around you. Make these practices a working part of your safety program. All accidents can be avoided.

- It is the roof handrail owner, operator, and maintenance personnel's responsibility to read and understand **ALL** safety instructions, safety decals, and manuals and follow them when operating, or maintaining the equipment.

- Owners must give instructions and review the information initially and annually with all personnel before allowing them to operate the roof handrail. Untrained users/operators expose themselves and bystanders to possible serious injury or death.
- The roof handrail is not intended to be used by children.
- Use the roof handrail for its intended purposes only.
- Do not modify the roof handrail in any way without written permission from the manufacturer. Unauthorized modification may impair the function and/or safety, and could affect the life of the roof handrail. Any unauthorized modification will void the warranty.

2.3. Personal Protective Equipment

The following Personal Protective Equipment (PPE) should be worn when installing the equipment.

Safety Glasses

- Wear safety glasses at all times to protect eyes from debris.

Coveralls

- Wear coveralls to protect skin.

Hard Hat

- Wear a hard hat to help protect your head.

Steel-Toe Boots

- Wear steel-toe boots to protect feet from falling debris.

Work Gloves

- Wear work gloves to protect your hands from sharp and rough edges.

2.4. Safety Decals

- Keep safety decals clean and legible at all times.
- Replace safety decals that are missing or have become illegible. See decal location figures that follow.
- Replaced parts must display the same decal(s) as the original part.
- Replacement safety decals are available **free of charge** from your distributor, dealer, or factory as applicable.

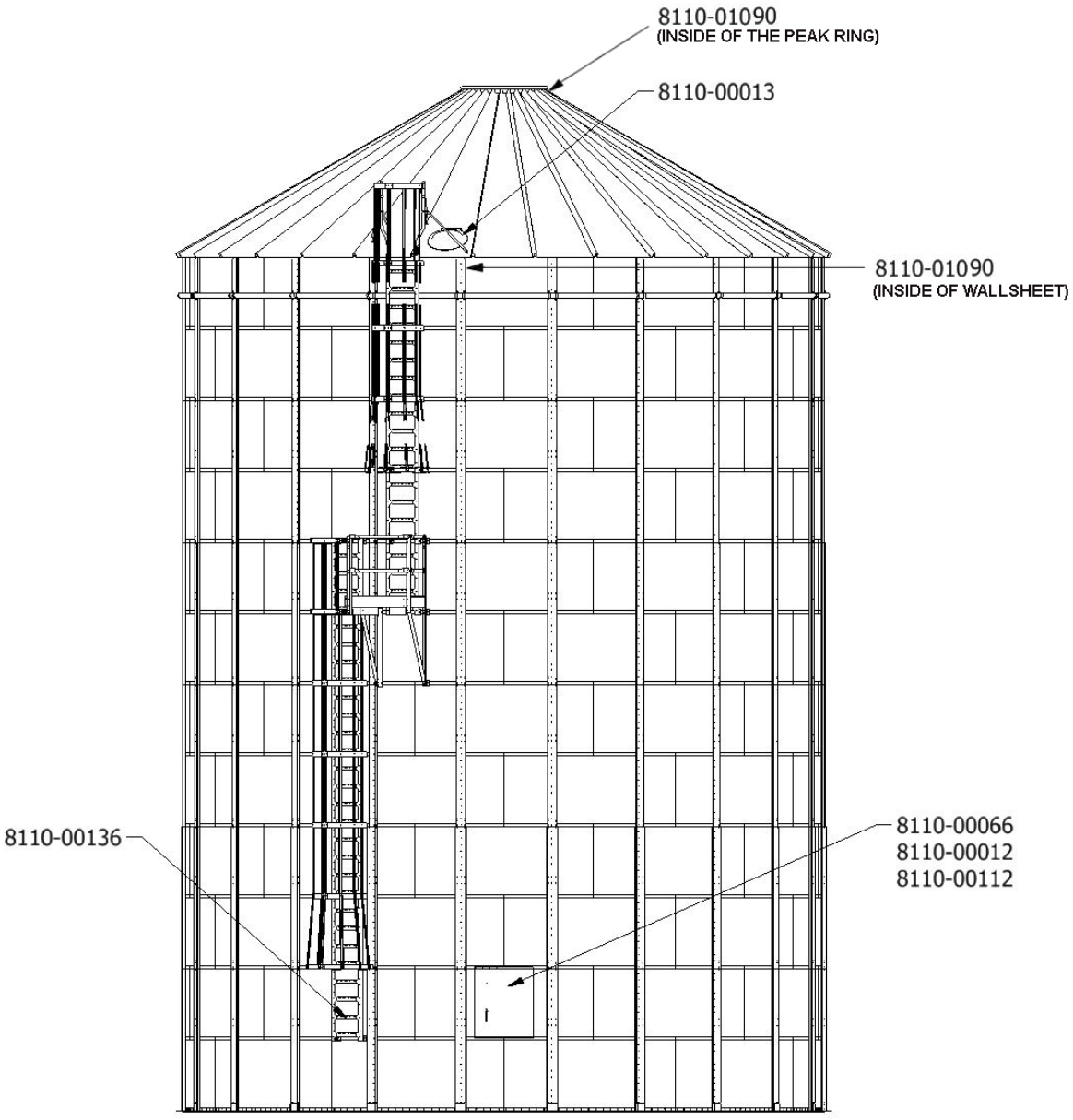
2.5. Decal Installation/Replacement

1. Decal area must be clean and dry, with a temperature above 50°F (10°C).
2. Decide on the exact position before you remove the backing paper.
3. Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
4. Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
5. Small air pockets can be pierced with a pin and smoothed out using the sign backing paper.

2.6. Safety Decal Locations and Details

Replicas of the safety decals that are attached to the roof handrail and their messages are shown in the figure(s) that follow. Safe operation and use of the roof handrail requires that you familiarize yourself with the various safety decals and the areas or particular functions that the decals apply to, as well as the safety precautions that must be taken to avoid serious injury, death, or damage.

Figure 1. Safety Decals



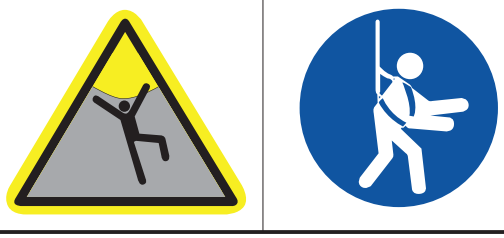
WARNING

SAFETY INSTRUCTIONS

- Read operator's manual and all safety decals before assembling, using, or servicing bin.
- Close/latch all access doors when not in use.
- Do not alter or modify bin structure.
- Replace any damaged components only with factory made components.
- This bin should only be used to store free flowing, granular material, unless specifically designed and marked otherwise.
- When filling, use top filler cap and direct material to center of bin.
- Do not over-fill bin. Material should not be in contact with or place pressure on roof sheets.

Part Number: 8110–00012

WARNING



ENTRAPMENT HAZARD

Never enter the bin when loading or unloading grain.

If you must enter the bin:

1. Shut off and lock out all power.
2. Use a lifeline, safety harness, and have an observer outside before entering the bin.
3. Wear proper breathing equipment or a respirator.
4. Avoid the center of the bin.

Failure to heed these warnings could result in serious injury or death.

Part Number: 8110–00013

WARNING

Rotating flighting could kill or dismember.

Flowing material could trap and suffocate.

Crusted material could collapse and suffocate.

Keep clear of all augers. DO NOT ENTER this bin!

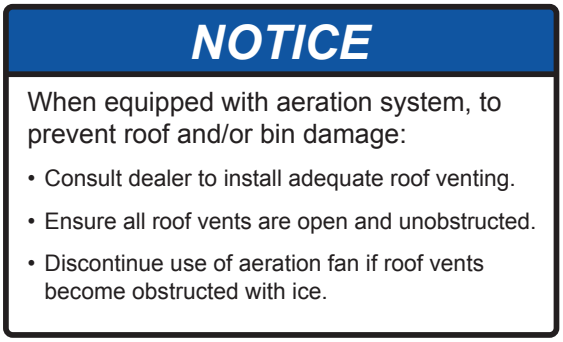
If you must enter the bin:

1. Shut off and lock out all power.
2. Use a safety harness and safety line.
3. Station another person outside the bin.
4. Avoid the center of the bin.
5. Wear proper breathing equipment or respirator.

Failure to heed these warnings could result in serious injury or death.

Part Number: 8110–00112

Part Number: 8110–00136



Part Number: 8110–00066

Part Number: 8110–01090

3. Before You Begin

3.1. Bin Design and Capacity

Standard Westeel Grain Bins are designed for:

1. Non-corrosive free-flowing materials up to 55 lbs/ft^3 (880 kg/m^3) average compacted bulk density.
2. Maximum horizontal gusted wind speed of 94 mph (151 km/h).
3. Zero seismic activity.

   Note

   Seismic resistance in grain bins varies with height and diameter. Many standard designs have significant seismic capabilities. Designs can be reviewed and/or modified to reflect local seismic requirements.

4. Roof loading capabilities vary with diameter, peak load and snow load.
   a. Peak Loads – standard peak loads follow. ***Upgrades are available.***

Table 1. Peak Loads for Various Roofs

Size	Type of Roof	Load (lbs)	Load (kg)
15’ to 24’	non-structural	4000 lbs	1814 kg
27’ to 48’	non-structural	5000 lbs	2268 kg
51’ & 54’	non-structural	8000 lbs	3629 kg
48’ to 108’	structural	20,000 lbs	9072 kg

   b. Roof Snow Loads (RSL) – at the above stated standard peak loads, standard RSLs vary with diameter and range from 16 psf (78 kg/m^2) to 45 psf (220 kg/m^2). ***Upgrades are available***.

      Note

      The correlation between ground snow load (GSL) and roof snow load (RSL) for grain bin designs vary with jurisdictions. In the US GSL = 2 x RSL. In Europe GSL = 1.25 x RSL. In Canada the correlation between GSL and RSL varies and is site specific.

   c. For maximum roof snow load capacities for various sizes and types of roofs, refer to the Roof Design Capacities sections that follow.

3.1.1 Roof Design Capacities for Non-Structural Roofs

Table 2. Maximum Roof Snow Load at STANDARD Peak Load

Bin Series	Std Peak Load	Standard Roof		Plus Upgrade 1		Plus Upgrade 2	
	lbs (kN)	psf	kPa	psf	kPa	psf	kPa
15	4000 (17.8)	45	2.15	n/a		n/a	
16		45	2.15				
18		45	2.15				
21		30	1.44	46	2.20		
24		21	1.01	39	1.87		
27	5000 (22.2)	24	1.15	39	1.87		
30		20	0.96	32	1.53	40	1.92
33		23	1.10	33	1.58	44	2.11
36		24	1.15	30	1.44	38	1.82
39		22	1.05	27	1.29	36	1.72
42		19	0.91	24	1.15	34	1.63
45		16	0.77	23	1.10	32	1.53
48		21	1.01	26	1.24	33	1.58
51	8000 (35.6)	20	0.96	28	1.34	n/a	
54		17	0.81	27	1.29		

Table 3. Maximum Roof Snow Load at UPGRADED Peak Load

Bin Series	Upgraded Peak Load	Standard Roof		Plus Upgrade 1		Plus Upgrade 2	
	lbs (kN)	psf	kPa	psf	kPa	psf	kPa
15	8000 (35.6)	29	1.39	n/a		n/a	
16		29	1.39				
18		29	1.39				
21		24	1.15	37	1.77		
24		17	0.81	26	1.24		
27	10000 (44.5)	19	0.91	28	1.34		
30		15	0.72	24	1.15	33	1.58
33		18	0.86	24	1.15	36	1.72
36		18	0.86	23	1.10	31	1.48
39		16	0.77	21	1.01	30	1.44
42		14	0.67	19	0.91	27	1.29
45		13	0.62	18	0.86	25	1.20
48*		16	0.77	21	1.01	26	1.24
51*	12000 (53.4)	14	0.67	21	1.01	n/a	
54*		13	0.62	20	0.96		

Note

1. Standard roofs are adequate for many applications but additional capacity is available when optional upgrade packages are used.
2. Upgrade packages include roof stiffening rings and/or rib supports.
3. For peak load between standard and upgrade limits, a straight line interpolation can be used to determine maximum roof snow load.
4. *Structural roofs for 48' – 54' with rafters are available to support peak ring loads greater than loads on Table 3.
5. Higher level upgrade kits include all components from lower level kit; only one upgrade kit needs to be ordered for any given bin.

3.1.2 Roof Design Capacities for Structural Roofs

Table 4. Maximum Roof Snow Load at STANDARD Peak Loads

Bin Series	Std Peak Load	Standard Roof	
	lbs (kN)	psf	kPa
48	20000 (89.0)	39	1.87
51		39	1.87
54		39	1.87
60		39	1.87
66		38	1.82
72		38	1.82
75		37	1.77
78		37	1.77
84		37	1.77
90		37	1.77
96		37	1.77
102		32	1.53
105		32	1.53
108		32	1.53

Table 5. Maximum Roof Snow Load at UPGRADED Peak Loads

Bin Series	Upgraded Peak Load	Standard Roof	
	lbs (kN)	psf	kPa
48	60000 (266.9)	38	1.82
51		38	1.82
54		38	1.82
60		38	1.82
66		37	1.77
72		37	1.77
75		36	1.72
78		36	1.72
84		36	1.72
90		34	1.63
96		34	1.63
102		31	1.48
105		31	1.48
108		31	1.48

Note

Standard capacities are provided. Additional capacity is available with optional upgrades.

3.1.3 Roof Snow Load vs. Ground Snow Load

The Roof Design Capacity tables reflect roof snow load (RSL) values. These are design values. Often, comparisons are made to ground snow values (GSL). These are not the same. The conversion from GSL to RSL varies between jurisdictions and is governed by building codes:

- In the United States, for grain bins, GSL = RSL x 2
- In Europe, for grain bins, GSL = RSL x 1.25

- In Canada, for grain bins, the GSL/RSL conversion varies with every location across the country. However, for comparison purposes, the US conversion can be used as an approximation.

Therefore, when comparing against competitive GSL values in the US, double the above values. When comparing against competitive GSL values in Canada, double the above values for a reasonably close approximation.

3.2. Foundation Design and Loads

The foundations for the stiffened bin models are based on 4000 lbs. per sq. ft. (192 kPa) soil bearing capacity. All foundation designs use 3000 lbs. per sq. in. (21 MPa) ultimate compressive strength (after 28 days) for concrete and 43,500 lbs. per sq. in. (300 MPa) re-bar. The foundation designs included in this manual are suggestions only, and will vary according to local soil conditions. Westeel will not assume any liability for results arising from their use.

Important

Foundation should be uniform and level. Level should not vary by more than ¼" over a span of four feet under the bottom ring angle. Any variance from level must be shimmed under upright base assembly. If being utilized to support a full floor aeration system, this levelness requirement should extend across the complete floor area.

3.3. Site and Assembly

Unless otherwise specifically provided in writing, Westeel does not take responsibility for any defects or damages to any property, or injury to any persons, arising from or related to any site or assembly considerations, including but not limited to:

- Bin location and bin siting
- Soil conditions and corresponding foundation requirements (note that the examples provided in manuals are for specifically stated soil conditions)
- Bin assembly (Westeel recommends the use of qualified bin installers; contact Westeel for information on installers in your area)
- Field modifications or equipment additions that affect the bin structure
- Interconnections with neighboring structures
- Compliance with all applicable safety standards, including but not limited to fall restraint systems (ladders or other systems). Local safety authorities should be contacted as standards vary between jurisdictions.

3.4. Methods of Installation

The recommendations for assembling and installing Westeel grain bins must be closely followed to achieve the full strength of the bin and to achieve adequate weather sealing. The product warranty is void if:

1. Wall sheets and/or uprights not specified for a given tier are used.
2. Foundations are found to be inadequate or out-of-level.
3. Anchor bolts (cast-in-place, drill-in, chemical type or other) are found to be inadequate.
4. Off-center loading or unloading is used. (This does not apply to the use of approved side unloading systems.)
5. Materials stored are not free-flowing or have a compacted bulk density greater than 55 lbs/ft^3 (880 kg/m^3).

If using bin jacks during assembly, always lift on an upright. Choose a hoist with a adequate capacity for the expected empty bin deadload. Make sure the rated capacity of the hoist is not exceeded.

3.5. Critical Assembly Requirements

To ensure a successful, safe and reliable outcome you must comply with the following assembly techniques and practices:

1. Comply with all local code and jurisdictional requirements applicable to your roof handrail installation.
2. Design and build foundations with the necessary strength for the loads they must support, and for local soil conditions. Westeel foundation guidelines are based on specific stated conditions and may not be applicable to local conditions.
3. Your foundation must provide uniform and level support to the structure being supported. Surface imperfections causing gapping must be remedied. This may involve, but not be limited to a) grouting under the bottom ring of a non-stiffened bin or tank, and b) shimming under the uprights of a stiffened bin or tank, or under the legs of a hopper.
4. Make sure that the proper hardware is utilized for all bolted connections. If a shortage occurs, do not substitute. Take the necessary steps to obtain the proper hardware. Make sure nuts are tightened to the required torque values as specified in the appropriate assembly manual.
5. Comply with all assembly instructions provided in the appropriate assembly manual to make sure your whole roof handrail is constructed safely. **Important: Do not deviate from the wall sheet and upright layouts provided.**
6. Before anchoring your structure to its foundation, make sure the structure is round. The maximum variation from perfect roundness is 3/4" on the radius. Locate anchor bolts toward the outside of the anchor bolt holes (away from the circle) to permit the incremental expansion that can occur with the initial filling.
7. When installing roof stiffening rings, if it is necessary to shorten the stiffening ring tubes, shorten them as little as possible. Initially the nuts on the expanders should be centered and as close together as possible. When tightening, share the amount of take-up between expanders such that the nuts remain centered, and the amount of engagement between all expanders on the same ring is equalized.
8. If extending an existing bin or tank, ensure that the foundation is adequate for the increased loads it must support.
9. If installing an existing bin on a hopper, make sure the bin is designed for a hopper application, and that the foundation is capable of withstanding the substantial point loads that the hopper legs apply. If uprights are present, make sure that they are supported.
10. Make sure that an integral end-to-end connection exists between all mating uprights. Successive uprights must not overlap.
11. Vertical tolerances between uprights and wall sheets are tight. This can be affected by “jacking” techniques, which can allow the tolerance to grow or shrink depending on the technique used. The gapping between successive uprights must be monitored to ensure that upright holes align with wall sheet holes.
12. If catwalks are being installed on the structure, upright catwalk upgrades are likely required. The upgraded stiffeners must be installed in the correct locations to support the intended catwalk loads. Also, the structure must be properly oriented to ensure the eventual correct alignment between the catwalks and the supporting uprights. Finally, the connectors that tie into the uprights and support the catwalks are best installed during assembly of the structure. See the catwalk assembly manual for additional details.

3.6. Product Storage

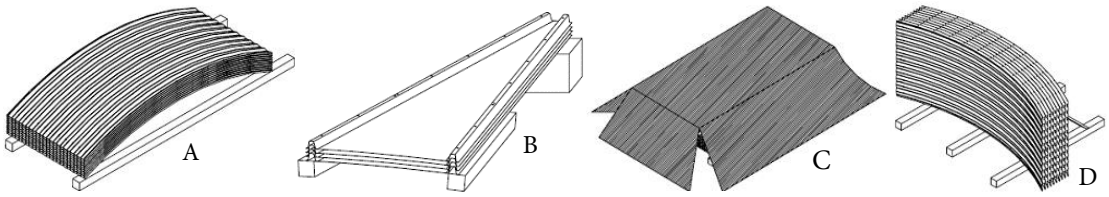
Rust on Galvanized Parts

1. White rust forms when moisture is allowed to collect on galvanized surfaces that have yet to develop the durable zinc oxide layer. This zinc oxide layer naturally occurs as the surface interacts with carbon dioxide, and is characterized over time by the dull grey appearance that weathered galvanized surfaces get.
2. Parts that are not well ventilated or well drained can collect water between surfaces and develop white rust.
3. White rust is not a structural concern if its development is stopped in the early stages. A light film or powdery residue can occur after a period of heavy rainfall or a short time of improper storage. If white rust has started to develop, separate parts and wipe off any moisture. Next, using a clean cloth, apply a thin layer of petroleum jelly or food-grade oil to the entire part.
4. If moisture is left on parts, this white rust can become more aggressive and turn into red rust. Red rust can cause degradation in the material and become a structural concern. Any parts that have red rust should be replaced immediately.

Storage Guidelines

- Keep all bundles dry before assembly of the bin.
- Start assembly as soon as possible.
- Do not lay bundles on the bare ground. Raise all bundles 6" to 8" off the ground on wood blocks or timbers. (See Detail A in Figure 2 on page 15.)
- Store curved wall sheets ‘hump-up’. (See Detail A in Figure 2 on page 15.)
- All other bundles material should be placed so that they are well sloped to promote good drainage. (See Detail B in Figure 2 on page 15.)
- Roof sheets must be elevated at least 12" at the small end of the sheets. (See Detail B in Figure 2 on page 15.)
- Temporary storage can be provided by erecting a simple framework supporting a waterproof tarp. (See Detail C in Figure 2 on page 15.)
- All bin boxes, ladder boxes and hardware boxes should be stored inside. These are not waterproof, and will deteriorate in normal weather conditions, allowing moisture to contact the parts inside.

Figure 2. Product Storage



If Parts Become Wet

1. If parts become submerged or wet, the bundles should be opened as soon as possible, sheets or material separated and dried. Keep separated until assembly.

   Brace parts properly so as to avoid damage or injury from material falling when in storage. (See Detail D in Figure 2 on page 15.)
2. Any boxed parts that become wet should be dried and stored in a new box that is free of moisture.

3. In addition to wiping down wall sheets, a food-grade oil can also be applied with a clean, lint-free cloth. This will assist in preventing any further moisture from contacting the galvanizing on the steel. Due to safety concerns with installation and use, Westeel does not recommend the use of oil on other parts such as roof sheets and safety ladders.

3.7. Grain Bin Use

- Do not off-center unload a grain bin. It is imperative to unload from the center of the bin first, until as much grain as possible has been removed, and only then proceed to unload from the next closest unload gate to the center. Continue utilizing the unload gates in succession from the center towards the outside. Gate control mechanisms should be clearly marked and interconnected to prevent an external gate from being opened first.
- The only exception to center unloading is when a properly designed and installed side draw system is utilized. However, as bins tend to go out of round when employing side draws, the bin must be completely emptied before refilling.
- When unloading a bin with a mobile auger through a properly designed auger chute, the entry end of the auger should be pushed into the center of the bin before the auger is engaged. Slower rates of flow are preferable and should not exceed the capacity of an 8” auger.
- Ensure that the inner door panels of grain bin doors are completely closed and latched before filling the grain bin.
- Never enter a loaded grain bin for any reason. Grain can be a killer.

3.8. Important Notes

- Westeel does not provide a foundation design for this product, and is not liable for any damages or injuries related to inadequately designed or constructed foundations. Customers must contract professional services for all foundation design and construction work. For information on foundation design requirements, refer to Section 3.2. – Foundation Design and Loads on page 13.
- In order to maintain your wall sheets in good condition separate sheets and allow air circulation between them. Store sheets in a dry place. Do not store sheets with sheet ends pointing upwards.
- To keep an even pressure on walls, the bin must always be unloaded from the centre.
- Contact local power officials for minimum power line clearance.
- See Section 3.5. – Critical Assembly Requirements on page 14 for mandatory siting and assembly requirements.
- Store only non-corrosive, free-flowing materials up to 55 lbs/ft^3 (800 kg/m^3) average compacted density in Westeel bins.
- Tighten all bolts to the recommended torque settings.
- Do not locate grain bins close to high buildings, which might cause snow to fall onto or build up on the roof of the grain bin. Consider future expansion and allow space for loading and unloading of the bin. Your dealer and local government agricultural consultants can help you plan your storage system for maximum efficiency.

4. Preparation

4.1. Check Shipment

Unload the parts at the assembly site and compare the packing slip to the shipment. Ensure that all items have arrived and that none are damaged.

Report damaged parts or shortages immediately to the delivering carrier, followed by a confirming letter requesting inspection by the carrier, if required. Order any replacement parts immediately to ensure that assembly will not be held up by missing parts. All parts will be charged for and credit will be issued by party at fault. No credit will be issued if freight bills are signed as received in good condition.

4.2. List of Tools and Equipment

Use quality tools and equipment. Use them safely, and correctly, for their intended use. Tools for this application should include:

Tools

- Electric or pneumatic (air) impact tools
- Power drill and drill bits
- Sockets (multiple 9/16" and 1/2" sockets recommended)
- Large-pocket carpenter pouch
- 8" (20 cm) metal punches (for aligning bolt holes)
- Step and extension ladders, construction grade
- 6-point wrenches (Imperial, box end)
- Metal-cutting saw suitable for cutting roof rings and wind rings
- Scaffolding
- Centre-post bin stand
- Crane and/or bin jacks

Minimum Recommended Safety Equipment

- A properly-stocked first-aid kit
- Eye, foot, head, and hand protection (safety glasses, steel-toed boots, hard hat, work gloves)
- Cable, chain, or rope to tie-off bin or jacks in case of wind
- Body harness and lifeline (for use where falling hazard exists)
- Ground fault interrupt protected electrical hook-ups

4.3. Order Optional Equipment

Optional equipment such as unloading augers, aeration equipment, anchor bolts, foundation sealant, external ladders, safety cage and platforms, etc., should all be on site and checked before assembly starts. Plan your installation in advance. For details, see assembly instruction supplied with optional equipment.

5. Assembly

Before continuing, ensure you have completely read and understood this manual's Safety section, in addition to the safety information in the section(s) below.

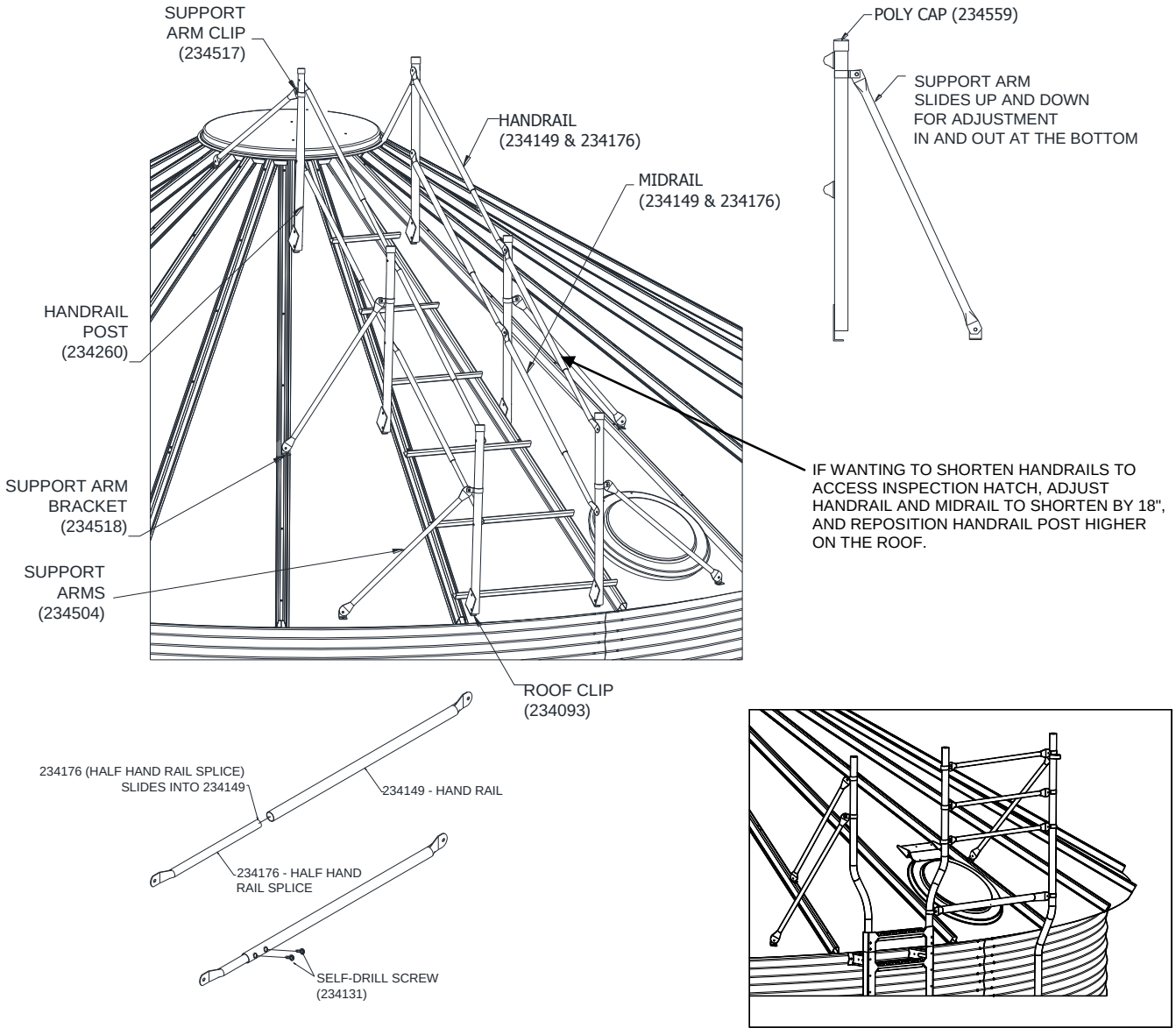
5.1. Assembly Safety

WARNING

- Do not take chances with safety. The components can be large, heavy, and hard to handle. Always use the proper tools, rated lifting equipment, and lifting points for the job.
- Carry out assembly in a large open area with a level surface.
- Always have two or more people assembling the roof handrail.
- Make sure you have sufficient lighting for the work area.
- Tighten all fasteners according to their specifications. Do not replace or substitute bolts, nuts, or other hardware that is of lesser quality than the hardware supplied by the manufacturer.
- Stay away from overhead power lines and other obstructions during assembly. Contact with power lines can cause electrocution.
- Do not work in high winds.

5.2. Roof Handrail Assembly

Figure 3. Roof Handrail and Inspection Hatch Railing Details



THE HANDRAIL AND HANDRAIL SPLICE STANDARD ASSEMBLY SHOULD HAVE A HOLE TO HOLE LENGTH OF APPROXIMATELY 50", FOR OTHER LOCATIONS NEAR THE TOP THE LENGTH SHOULD BE ADJUSTED ACCORDINGLY.

PARTS FOR AN INSPECTION HATCH RAILING ARE AVAILABLE ON REQUEST - SHOWN ABOVE - SEE IMPORTANT NOTE *

Important

***** Shortening the handrail should only be done if you are enclosing the inspection hatch area. This is done by adding the ladder inspection hatch package (234625) to the existing ladder.

1. Secure the roof clips (234093) to the handrail posts (234260) using 2 ½" bolts.
2. Position the lower handrail posts on either side of the roof rungs, in close proximity to the top ring angle.

a. Stabilize using support arms (234504) attached to the posts with support arm clips (234517) and to the roof panels with the support arm brackets (234518).

b. Make sure the lower arms tie into the eave bolts through the top ring angle.

c. Before tightening, move the support arm clips up or down the support posts as needed to adjust the lower end.

d. Use 3/8" x 1" bolts to attach both the support arm clips and the support arm brackets.

3. Measure 50" up the surface of the roof and attach the next set of posts.

a. Position the roof clips in close proximity to a rib for increased stability.

b. Drill holes into the roof panel and secure with 3/8" x 1" bolts.

c. Stabilize using support arms, clips, and brackets as above, but this time with the brackets tying into the roof ribs.

d. To increase stability in the up and down direction, angle the support arms relative to the handrail line (i. e. something other than 90°).

e. Preferably the angle will vary (one up and one down) on the adjacent support arms.

4. Attach the hand rails and the mid rails between the two sets of posts.

a. Cut brace 234176 (1" OD x 54" long) in half to make two pieces.

b. Use each half as a splice, sliding them inside handrail 234149 (1.25" OD x 34" long).

c. Attach the half 234176 splices onto the lower posts at both handrail and mid rail locations.

d. Slide the 234149 handrails over the splices and attach to the upper posts, along with the half 234176 splices for the next handrail section up the roof.

e. Use 3/8" x 2.5" bolts in all post connections.

f. Secure the inner splice tubes to the handrail using two 3/4" self-drilling screws.

g. Make sure there is approximately 10" of tube overlap inside a standard 50" long handrail section.

5. Repeat the procedure for the upper handrail sections as required.

Note

Handrail and mid rail 3/8" x 2.5" bolts should only be fully tightened when the hand and mid rails both below and above the post are fully spliced and positioned.

6. Measure and install the handrail sections at 50" lengths until there are two sections remaining.

a. Measure the remaining distance and split it evenly between the remaining two handrails sections.

b. Install the next–to-last post at half of the remaining distance, rather than at 50".

Note

The length for the two remaining sections could be too small for the splice/handrail combination for some roof diameters. In that case the handrail 234149 will need to be cut shorter to allow for installation.

c. The support arms on the uppermost posts should be angled forward toward the extra support provided by the peak ring.

6. Appendix

6.1. Roof Handrail Packages (234250- 62)

Table 6. Roof Handrail Packages — 15’ to 54’

PART NUMBER	DESCRIPTION	15'-18'	21'-24'	27'-33'	36'-42'	45'-48'	51'-54'
		234250	234252	234254	234257	234263	234264
234149	SPIRAL STAIR HANDRAIL	8	12	16	20	24	28
234176	SPIRAL STAIR BRACE	4	6	8	10	12	14
234260	ROOF HANDRAIL POST	6	8	10	12	14	16
234504	LADDER SUPPORT ARM	6	8	10	12	14	16
234517	LADDER SUPPORT ARM CLIP	6	8	10	12	14	16
234518	LADDER SUPPORT ARM BRACKET	6	8	10	12	14	16
234093	ROOF PEAK RAIL SUPPORT POST CLIP	6	8	10	12	14	16
234559	POLY CAP FOR 1.66 OD LADDER TUBE	6	8	10	12	14	16
234261	ROOF STAIRS HARDWARE PACKAGE	1	1	1	1	1	1

Table 7. Roof Handrail Packages — 60’ to 108’

P ART NUMBER	DESCRIPTION	60'-66'	72'-78'	84'	90'	96'	102'-108'
		234266	234268	234270	234271	234272	234273
234149	SPIRAL STAIR HANDRAIL	32	40	44	48	52	56
234176	SPIRAL STAIR BRACE	16	20	22	24	26	28
234260	ROOF HANDRAIL POST	18	22	24	26	28	30
234504	LADDER SUPPORT ARM	18	22	24	26	28	30
234517	LADDER SUPPORT ARM CLIP	18	22	24	26	28	30
234518	LADDER SUPPORT ARM BRACKET	18	22	24	26	28	30
234093	ROOF PEAK RAIL SUPPORT POST CLIP	18	22	24	26	28	30
234559	POLY CAP FOR 1.66 OD LADDER TUBE	18	22	24	26	28	30
234261	ROOF STAIRS HARDWARE PACKAGE	2	2	2	2	2	2

Table 8. Roof Handrail Hardware (234261)

PART NUMBER	DESCRIPTION	QTY
235943	BLT HFW 3/8 X 1 Gr 8 (bag of 50)	2
150517	BLT HEX 3/8 X 2.5" Gr 5	70
235951	NUT HEX 3/8" Gr 5 (bag of 100)	2
234131	SELF DRILL SCREW 12-14X.75 ZN (12)	2
198939	INSTRUCTIONS	1

7. Limited Warranty: Westeel Grain Bin Products

Westeel – Ag Growth International ("Westeel") warrants products that it has manufactured and/or that are branded with its name (the "goods") subject to the following terms and limitations, (the "warranty"):

Duration of Warranty

This warranty will run from the date of purchase from the dealer or distributor, authorized by Westeel. The duration of the warranty is limited as follows:

Galvanized Bins	5 years
EasyFlow2	24 months
Westeel Fans	36 months
Floors	12 months
Catwalk	12 months
Bulk Feed Tanks	24 months
SeedStor-K Cones	
Paint	12 months
Structural	30 months
Elite Cones	
Paint	30 months
Structural	10 years
WESTEEL cones	
Paint	No Warranty
Structural	12 months
Smooth Wall Bins	
Paint	60 months
Structural	10 years
Commercial Smooth Wall Bins	
Paint	12 months
Structural	10 years

Limitation of Remedies Replacement

Within the warranty period, Westeel will replace the goods and/or original manufactured components thereof which are found, to Westeel's satisfaction, to be defective. Westeel is not responsible for direct, indirect, special, consequential, or any other damages of any kind, including personal injury to any individual, howsoever caused, including caused by transportation of the goods for repair or replacement.

Procedure for Obtaining Service

In the event of a warranty claim, the purchaser must complete any and all information required by Westeel in order to properly assess or investigate the claim. Westeel will not be responsible for the removal of any of the goods found to be defective, or transportation charges to and from Westeel's authorized dealer or distributor, or for installation of any replacement goods and/or parts furnished under the warranty.

Limitations as to Scope of Warranty

The warranty does not extend to defects or damage caused, in whole or in part, by:

1. use of a kind and/or to a degree not reasonably expected to be made of the goods;
2. improper storage of the goods both prior to and after purchase;
3. damage caused by, or in the course of, installation or assembly;
4. any use of the goods which is not an intended use as specified in Westeel's published product literature, or otherwise specified by Westeel in writing;
5. any equipment attached to or used in conjunction with the goods;
6. any field modifications or substitutions to original bin components;
7. inadequate ventilation or any other circumstance not in keeping with proper maintenance and/or use of the goods;
8. Acts of God, accident, neglect or abuse of the goods by the purchaser and/or any other individual or entity; or
9. Any use or installation inconsistent with Westeel’s Standard Disclaimers.

Limitations as to Manufacturer

The warranty does not cover products sold by Westeel that are not manufactured by Westeel. In those circumstances, the purchaser is referred to the manufacturer of those products.

Limitation of Implied Warranties and Other Remedies

To the extent allowed by law, neither Westeel nor its dealers, nor any company affiliated with Westeel makes any warranties, representations, or promises as to the quality, performance, or freedom from defect of any Product covered by this Warranty.

WESTEEL HEREBY DISCLAIMS, TO THE EXTENT APPLICABLE, ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. A PURCHASER’S ONLY REMEDIES IN CONNECTION WITH THIS WARRANTY ARE THOSE SET FORTH IN THIS WARRANTY. IN NO EVENT WILL WESTEEL, ITS DEALERS, OR ANY COMPANY AFFILIATED WITH WESTEEL BE LIABLE FOR INCIDENTIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES.

Some jurisdictions do not allow waivers of certain warranties, so the above waivers may not apply to you. In that event, any implied warranties are limited in duration to ninety (90) days from delivery of the products. You may also have other rights which vary from jurisdiction to jurisdiction.

Exclusive Warranty

This warranty is the only warranty provided by Westeel and all other warranties and/or commitments, whether express or implied and no matter by whom made, statutory or otherwise, are subsumed and replaced by it and are of no legal effect. If any provision of the warranty is held by a court of

competent jurisdiction to be void or unenforceable, in whole or in part, such provision shall be deemed severable and will not affect or impair the legal validity of any other provision of the warranty.

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